

**U.S. EPA 2004 Nanotechnology Science To Achieve Results (STAR)
Progress Review Workshop — Nanotechnology and the Environment II**

**Loews Philadelphia Hotel
1200 Market Street
Philadelphia, PA 19107**

August 18 – 20, 2004

Agenda

Wednesday, August 18, 2004

9:30 – 10:00 a.m. Registration

Overview

10:00 – 10:15 a.m. Welcome – Stephen A. Lingle
Director, Environmental Engineering Research Division, U.S. EPA, ORD,
NCER

**10:15 – 10:40 a.m. Overview of Nanotechnology—Responsible Research and Development
of Nanotechnology**
Mihail Roco, National Science Foundation

**10:40 – 11:05 a.m. EPA's Nanotechnology Program—Vision of How Nanotechnology Can
Be Used To Protect, Inform, Manage, and Improve the Environment
and How Harm From Nanotechnology Can Be Studied and Prevented**
Barbara Karn, US EPA, ORD, NCER, Washington, DC

Plenary Talks

**11:05 – 11:35 a.m. *Nanotechnology Applications for Environmental Sensors: Rapid and
Precise Monitoring; Lab-on-a-Chip Devices; Real-Time Analyses;
Remote, In Situ, and Continuous Devices***
Nongjian Tao, Arizona State University

**11:35 a.m. – 12:05 p.m. *Nanotechnology Applications for Treatment: Cost-Effective and
Rapid Technologies; Smart Materials or Active Surface Coatings***
Wilfred Chen, University of California–Riverside

**12:05 – 12:35 p.m. *Nanotechnology Applications for Remediation: Cost-Effective and Rapid
Technologies; Removal of Contaminants From Soil, Ground Water, and
Aqueous Environments***
Gregory Wilson, The American Association for the Advancement of
Science

12:35 – 1:35 p.m. Lunch

**1:35 – 2:05 p.m. *Nanotechnology Applications for Green Manufacturing: Minimize
Harmful Emissions and Generated Wastes; Reuse; Recycle; Benign
Chemical Processes; Self-Assembly***
Lawrence T. Drzal, Michigan State University

2:05 – 2:35 p.m. *Nanotechnology Implications in the Environment and Human Health: Life Cycle Assessment, Ecosystem Health, Persistence, Toxicity, Fate and Transport, Bioavailability, Bioaccumulation/Biotransformation*
Nora Savage, US EPA, ORD, NCER, Washington, DC

Green Manufacturing
Barbara Karn, Chair

2:35 – 2:55 p.m. *Green Engineering of Dispersed Nanoparticles: Measuring and Modeling Nanoparticle Forces*
Kristen Fichthorn, The Pennsylvania State University

2:55 – 3:15 p.m. *Sustainable Biodegradable Green Nanocomposites From Bacterial Bioplastic for Automotive Applications*
Lawrence T. Drzal, Michigan State University

3:15 – 3:35 p.m. *Development of Nanocrystalline Zeolite Materials as Environmental Catalysts: From Environmentally Benign Synthesis to Emission Abatement*
Sarah C. Larsen, University of Iowa

3:35 – 4:00 p.m. **Break**

4:00 – 4:20 p.m. *Plasmon-Sensitized TiO₂ Nanoparticles as a Novel Photocatalyst for Solar Applications*
George Chumanov, Clemson University

4:20 – 4:40 p.m. *Graft Polymerization as a Route To Control Nanofiltration Membrane Surface Properties To Manage Risk of EPA Candidate Contaminants and Reduce NOM Fouling*
George Belfort, Rensselaer Polytechnic University

4:40 – 5:00 p.m. *Ecocomposites Reinforced With Cellulose Nanoparticles: An Alternative to Existing Petroleum-Based Polymer Composites*
William T. Winter, The State University of New York

5:00 – 5:20 p.m. **Break**

Aerosols
Maria Rodriguez, Chair

5:20 – 5:40 p.m. *Elemental Composition of Freshly Nucleated Particles*
Murray V. Johnston, University of Delaware

5:40 – 6:00 p.m. *Ion-Induced Nucleation of Atmospheric Aerosols*
Peter H. McMurry, University of Minnesota

6:00 p.m. **Adjourn**

7:00 p.m. **Dinner – Zanzibar Blue** (Web Site: zanzibarblue.com/pa/)
\$50/person, 200 S. Broad Street. Please contact Barbara Karn or Nora Savage for reservations.

Thursday, August 19, 2004

8:40 a.m. – 1:50 p.m. Sensors
Marti Otto, Chair

8:40 – 9:00 a.m. *Nanostructured Porous Silicon and Luminescent Polysiloles as Chemical Sensors for Carcinogenic Chromium (VI) and Arsenic (V)*
William C. Trogler, University of California–San Diego

9:00 – 9:20 a.m. *Nanosensors for Detection of Aquatic Toxins*
Robert E. Gawley, University of Arkansas

9:20 – 9:40 a.m. *Micro-Integrated Sensing Systems by Controlled Self Assembly of Nanoparticles*
Somenath Mitra, New Jersey Institute of Technology

9:40 – 10:00 a.m. *Advanced Nanosensors for Continuous Monitoring of Heavy Metals*
Omowunmi Sadik, State University of New York–Binghamton

10:00 – 10:20 a.m. *Metal Biosensors: Development and Environmental Testing*
Anne J. Anderson, Utah State University

10:20 – 10:40 a.m. Break

10:40 – 11:00 a.m. *Compound Specific Imprinted Microspheres for Optical Sensing*
Barry K. Lavine, Oklahoma State University

11:00 – 11:20 a.m. *Ultrasensitive Pathogen Quantification in Drinking Water Using Highly Piezoelectric PMN-PT Microcantilevers*
Wan Y. Shih, Drexel University

11:20 – 11:40 a.m. *Nanomaterial-Based Microchip Assays for Continuous Environmental Monitoring*
Joseph Wang, New Mexico State University

11:40 – 12:00 noon *Low-Cost Organic Gas Sensors on Plastic for Distributed Environmental Monitoring*
Vivek Subramanian, University of California–Berkeley

12:00 – 12:20 p.m. *The Silicon Olfactory Bulb: A Neuromorphic Approach to Molecular Sensing With Chemoreceptive Neuron MOS Transistors (CvMOS)*
Edwin C. Kan, Cornell University

12:20 – 1:30 p.m. Lunch

1:30 – 1:50 p.m. *A Nanocontact Sensor for Heavy Metal Ion Detection*
Nongjian Tao, Arizona State University

Remediation
Philip Sayre, Chair

1:50 – 2:10 p.m. *Membrane-Based Nanostructured Metals for Reductive Degradation of Hazardous Organics at Room Temperature*
Dibakar Bhattacharyya, University of Kentucky

2:10 – 2:30 p.m.	<i>Dendritic Nanoscale Chelating Agents: Synthesis, Characterization, Molecular Modeling, and Environmental Applications</i> Mamadou S. Diallo, California Institute of Technology
2:30 – 2:50 p.m.	<i>Synthesis, Characterization, and Manipulation of (FeS-PAMAM) Dendrimer Nanocomposites</i> Lajos Balogh, University of Michigan
2:50 – 3:10 p.m.	<i>Hollow and Nanoporous Iron Particles</i> Wei-Xian Zhang, Lehigh University
3:10 – 3:30 p.m.	Break
3:30 – 3:50 p.m.	<i>Developing Functional Fe⁰-Based Nanoparticles for In Situ Degradation of DNAPL Chlorinated Organic Solvents</i> Gregory V. Lowry, Carnegie Mellon University
3:50 – 4:10 p.m.	<i>A Bioengineering Approach to Nanoparticle-Based Environmental Remediation</i> Daniel R. Strongin, Temple University
Implications Philip Sayre, Chair	
4:10 – 4:30 p.m.	<i>Societal Implications of Nanotechnology: Benefits and Costs</i> Earl R. Beaver, Practical Sustainability, LLC
4:30 – 4:50 p.m.	<i>A Life Cycle Analysis Approach for Evaluating Future Nanotechnology Applications</i> Shannon Loyd, Carnegie Mellon University
4:50 p.m.	Adjourn

Friday, August 20, 2004

Treatment

Anita Street, Chair

8:40 – 9:00 a.m. *NO_x reduction With Transition Metal Carbide Nanoparticles*
S. Ismat Shah, University of Delaware

9:00 – 9:20 a.m. *Simultaneous Environmental Monitoring and Purification
Through Smart Particles*
Wolfgang M. Sigmund, University of Florida

9:20 – 9:40 a.m. *Nanoscale Biopolymers With Tunable Properties for Improved
Decontamination and Recycling of Heavy Metals*
Wilfred Chen, University of California–Riverside

9:40 – 10:00 a.m. *Use of Ozonation in Combination With Nanocrystalline Ceramic
Membranes for Controlling Disinfection By-Products*
Simon Davies, Michigan State University

10:00 – 10:30 a.m. **Break**

Fate, Transport, and Transformation

Kevin Dreher, Chair

10:30 – 10:40 a.m. *Absorption and Release of Contaminants Onto Engineered
Nanoparticles*
Mason Tomson, Rice University

10:40 – 10:50 a.m. *Impacts of Manufactured Nanomaterials on Human
Health and the Environment: A Focus on Nanoparticulate Aerosol
and Atmospherically Processed Nanoparticulate Aerosol*
Vicki Grassian, University of Iowa

10:50 – 11:00 a.m. *Chemical and Biological Behavior of Carbon Nanotubes in Estuarine
Sedimentary Systems*
Lee Ferguson, University of South Carolina

11:00 – 11:10 a.m. *Transformations of Biologically Conjugated CdSe Quantum Dots
Released Into Water and Biofilms*
Patricia Holden, University of California–Santa Barbara

11:10 – 11:20 a.m. *Repercussion of Carbon-Based Manufactured Nanoparticles on
Microbial Processes in Environmental Systems*
Ronald Turco, Purdue University

11:20 – 11:30 a.m. *The Fate, Transport, Transformation and Toxicity of
Manufactured Nanomaterials in Drinking Water*
Paul Westerhoff, Arizona State University

Toxicology

Kevin Dreher, Chair

11:30 – 11:40 a.m.

Shore-Term Chronic Toxicity of Photocatalytic Nanoparticles to Bacteria, Algae, and Zooplankton

Chin-Pao Huang, University of Delaware

11:40 – 11:50 a.m.

Evaluation of Nanoparticles Interactions With Skin

Nancy Monteiro-Reviere, North Carolina State University

11:50 a.m. – 12:00 noon

Physical and Chemical Determinants of Nanofiber/Nanotube Toxicity

Robert Hurt, Brown University

12:00 – 12:30 p.m.

Closing Remarks

Barbara Karn and Nora Savage, US EPA, ORD, NCER, Washington, DC

12:30 p.m.

Adjourn